AD_____
(Leave blank)

Award Number: W81XWH-08-2-0091

TITLE: Telerehabilitation for OIF/OEF Returnees with Combat-Related Traumatic Brain Injury.

PRINCIPAL INVESTIGATOR: Kris Siddharthan, Ph.D.

CONTRACTING ORGANIZATION: James Haley Veterans Research & Education Foundation
Tampa, Fl 33612-4745

REPORT DATE: June 2009

TYPE OF REPORT: Annual

PREPARED FOR: U.S. Army Medical Research and Materiel Command
Fort Detrick, Maryland 21702-5012

DISTRIBUTION STATEMENT:

X Approved for public release; distribution unlimited

☐ Distribution limited to U.S. Government agencies only;
report contains proprietary information

The views, opinions and/or findings contained in this report are those of the author(s) and should not be construed as an official Department of the Army position, policy or decision unless so designated by other documentation.

REPORT DOCUMENTATION PAGE

Form Approved
OMB No. 0704-0188

1. REPORT DATE	2. REPORT TYPE	3. DATES COVERED
01-06-2009	Annual	06/01/2008 to 05/31/2009

4. TITLE AND SUBTITLE

Telerehabilitation for OIF/OEF Returnees with Combat-Related Traumatic Brain Injury

5a. CONTRACT NUMBER
W81XWH-08-2-0091

5b. GRANT NUMBER

5c. PROGRAM ELEMENT NUMBER

6. AUTHOR(S)

Kris Siddharthan, Ph.D.

Email: kris.siddharthan@med.va.gov

5d. PROJECT NUMBER

5e. TASK NUMBER

5f. WORK UNIT NUMBER

7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)
James A Haley Veterans Research and Education Foundation
Tampa Fl 33612-4745

8. PERFORMING ORGANIZATION REPORT NUMBER

9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)
U.S. Army Medical Research and Materiel Command
Fort Detrick, Maryland 21702-5012

10. SPONSOR/MONITOR'S ACRONYM(S)

11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION / AVAILABILITY STATEMENT
Approved for Public Release; Distribution Unlimited

13. SUPPLEMENTARY NOTES

14. ABSTRACT

The telerehabilitation for OEF/OIF returnees with mild or moderate combat related Traumatic Brain Injury (TBI) has as its objectives 1) care coordination for wounded veterans using distance technology via the internet and 2) monitoring of physical and mental health outcomes using a variety of instruments. The aim of the program is to ultimately enroll a minimum of 60 veterans with TBI at least 15 of who will have a clinical diagnosis of PTSD. To date we have enrolled 45 veterans in the study and are actively following 40 veterans We have collected baseline health status data on most patients. Our initial findings indicate that 1) Functional capabilities measured by locomotion and mobility appear to have stabilized among our cohort of veterans while deficiencies in cognition (memory, problem solving), psychosocial adjustment (anger, emotional status) and problems in integrating into society pose challenges 2) Individualized treatment pathways are needed for rehabilitation and ultimate integration into society and 3) Veterans have expressed appreciation for the program.

15. SUBJECT TERMS
None provided.

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			USAMRMC
U	U	U	UU	16	19b. TELEPHONE NUMBER *(include area code)*

Table of Contents

Telerehabilitation for OIF/OEF Returnees with Combat-Related Traumatic Brain Injury.

Introduction

Goals: This is one project in a planned program of research to improve care for injured Operation Enduring Freedom/Operation Iraqi freedom (OEF/OIF) veterans. We propose with this study to test a telerehabilitation program for veterans with combat related traumatic brain injure (TBI) with or without comorbid post traumatic stress disorders (PTSD) by monitoring functional, cognitive and mental health outcomes together with their integration into society using a variety of instruments. Coordinating medical care at a distance and thereby reducing their utilization of the VA health system is another important goal of this telerehabilitation intervention.

The *long term* goal of this program of research is to optimally define telerehabilitation services for all veterans with polytrauma, including accurate and efficient screening instruments, educational material for patients and families, family support, and family counseling to enhance care coordination and to maximize functional outcomes and quality of life.

The Telerehabilitation intervention: Veterans who meet the inclusionary criterion of a clinical diagnosis of combat incurred mild or moderate TBI in Iraq and Afghanistan and who utilize the James A Haley (JAH) Veterans Hospital in Tampa, Fl as their primary source of care and who in the opinion of care providers in the Polytrauma Clinic at JAH will possibly benefit from the program are eligible to be consented for participation. They are provided Dell^{R} laptop computers to communicate at least once weekly on a secured VA server with the care coordinator (Ms Susan Brock, RN) who also meets them at their scheduled outpatient visits at the JAH. The RN helps in a variety of care coordination efforts including scheduling appointments with specialists, medication management, counseling and monitoring outcomes. The RN coordinates care for Post Traumatic Stress Disorders (PTSD) with a clinical psychologist at the JAH.

Challenges in care delivery: Our challenge has been establishing a “secure virtual highway” to conduct the telerehab intervention. The VA has no national program for providing individualized care coordination for veterans via telemedicine. It does have an e-health portal where veterans may submit and track vital signs such as BP readings and cholesterol levels but one that does not provide for individualized care.

The Veterans Integrated Service Network of Florida (VISN 8) which includes the Tampa VA currently uses the Health Hero patient management system and uses store and forward technology using the Health Buddy and web based solutions as part of its program to support patients with chronic conditions such as Congestive Heart Failure, diabetes, hypertension, COPD and mental illness. However, this technology does not allow for the posting of individualized questions for tracking health conditions and care coordination a key component of our proposed telerehabilitation intervention.

We have, on a temporary basis contracted with the North Florida/South Georgia VA at Gainesville to allow us to “piggyback” on their existing LAMP telehealth program that allows for individualized questions and dialogues. Charles Levy, MD, Director, Physical Medicine and Rehabilitation services and a Co Investigator on our study has permitted the use of the LAMP sever for our needs (as a separate application from the LAMP patients followed in his program). Telemedicine applications are continuously in development at the Tampa VA. We expect to provide care via the James Haley Information Resources at a later date.

Home visit to assess functional status and home environment: The Physical Medicine and Rehabilitation Service at the JAH provides a service wherein visits to the homes of combat injured veterans are made by qualified Occupational Therapists who add functional aids such as hand rails and ramps for wheel chairs in the homes to aid in ambulatory function. Other assistive devices include modifications to the kitchen to accommodate the needs of the veterans. The cost to the VA is limited to $2,000 per veteran.

Monitoring health outcomes; Veterans are required to connect (via the internet) to a secured commercial website (SurveyMonkey.com^{R}) to provide responses to a variety of instruments to monitor their health

outcomes over time including the Functional Independence and Functional Assessment Measure™ (FIM/FAM), the Craig Handicap Assessment and Reporting Technique (CHART), the PTSD Checklist Military Form, Modified PTSD Symptom Scale, Self-Report Alcohol Use Disorders Identification Test (AUDIT), Self Report Beck Depression Inventory and the Medical Outcomes Social Support Survey.

Research team: The telerehabilitation care coordination team is organized under a primary care physician, namely, Steve Scott MD, Chief Physical Medicine and Rehabilitation Services VA. Andrea Spehar, MPH, JD is the program manager. Two full time polytrauma nurses, Sue Brock RN and Maria Morales RN, aid in recruiting veterans to the study. Assisting them is William Lapcevic, MSST, MPH an expert in information technology and data management. We have added Paula Chapman, PhD and Rebecca Kayo, PhD (clinical psychologist) to our team of researchers to identify and follow our cohort of enrolled veterans with combat related TBI with comorbid PTSD.

Body

The following tasks have been completed with additional details below.

Task 1. Administrative tasks, Months 1-3: **Completed**

a. Obtain Institutional Review Board and conduct literature review.
b. Recruit LAMP coordinator care coordination RN.
c. Recruit technical personnel (LAMP technician) and software analyst.
d. Order computers, load software programs/dialogues and set up web site on VA servers.

Task 2. Patient recruitment and programming, Months 3-32: **Ongoing/Partially Completed**

1. Finalize list of all OEF/OIF returnees discharged from the Tampa PT/BRI Center with a primary or secondary diagnosis of TBI. **Completed**
2. Contact (phone/internet/mail) patients who meet inclusion criterion and agree to participate in LAMP and have informed consents signed. **Ongoing**

Task 3. Initial home visits to assess functional status and home environment, Months 3-32: **Ongoing by Physical Medicine & Rehabilitation Service at the James A Haley Veterans Hospital.**

1. Conduct initial home visit to assess functional status and home environment
2. Make recommendations for assistive devices and environmental interventions
3. Purchase assistive technology through appropriate VA providers and provide training.
4. Set up the dialogues. **Completed**

Task 4. Data Collection: Months 5-32: **Ongoing**

1. Abstract from the Veterans' health Information Systems & Technology Architecture (VistA) medical record abstracts pertaining to health care utilization and treatments of TBI patients.
2. Abstract from the VA Decision Support System (DSS) cost estimates of VA Health Care Utilization.
3. Download responses to patient inputs concerning FIM, CHART and QUEST.
4. Conduct patient/caregiver satisfaction surveys and perceptions on facilitators and barriers to TBI LAMP.

Task 5. Data Analysis: Months 32-36: **To Be Addressed**

1. Conduct statistical analysis to determine:

a. Changes in functional status and community integration
b. Satisfaction with assistive devices and technology
c. Changes in patterns of healthcare utilization and associated costs
d. Satisfaction with TBI LAMP

2. Conduct interviews to synthesize facilitators and barriers to providing telerehabilitation for TBI.

Task 6. Final Analyses and Report Writing: Months 36-40: **To Be Addressed**
a. Prepare final report and initial manuscripts.

Patient characteristics

Demographics: A total of 45 veterans have consented to the telerehabilitation study. Some of the injured were transferred from Walter Reed hospital to the Physical Medicine and Rehabilitation Service at the JAH and were subsequently discharged but still utilize the outpatient services at the JAH while others were discharged from other military or VA facilities and chose to reside in the Tampa area partly due to the availability of health care at the JAH. We are actively following 40, one of whom is a female who sustained TBI due to indirect fire. Reasons for discontinuation of rehabilitation to five individuals include mortality (1), moving away from the area (2), incarceration (1) and non compliance (1). The patients range in age from 22 to 54 years with a mean age of 29 years. The majority of veterans classify themselves as white with 2 identifying themselves as African Americans and 10 others as of Hispanic origin. Table 1 provides for a breakdown of race and ethnicity among enrollees.

Table 1: Racial and Ethnic Characteristics (n=40)

Race					
White	Black or African American	Declined to answer	Unanswered	Unknown	TOTAL
27	**2**	**3**	**7**	**1**	**40**
Ethnicity					
Not Hispanic or Latino	Hispanic or Latino	Declined to answer	Unanswered		TOTAL
26	**10**	**3**	**1**		**40**

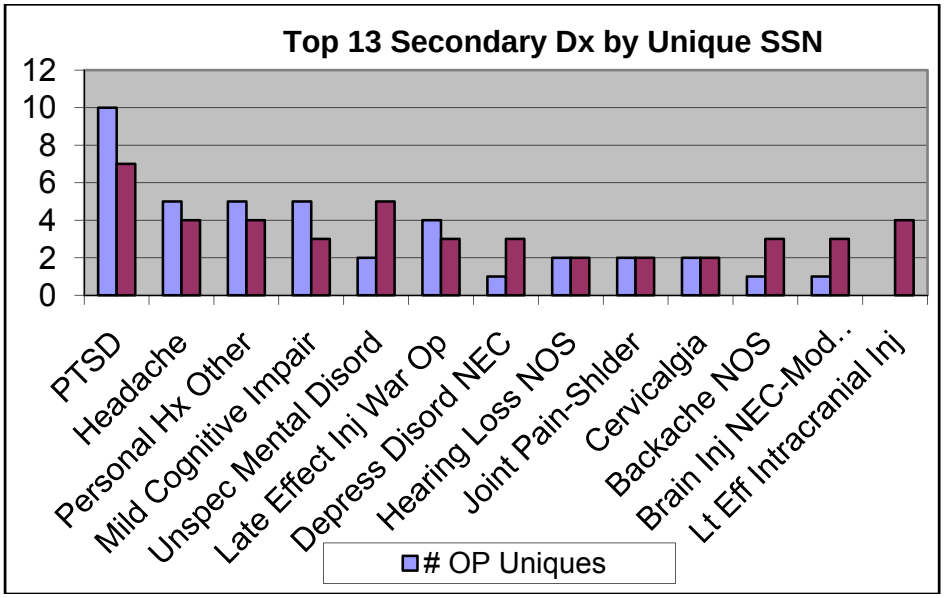
Health Status

As per the inclusionary criterion for participation in telerehabilitation all veterans have a primary clinical diagnosis of Traumatic Brain Injury incurred in combat theatres in Iraq and Afghanistan. Though the mechanism of injury is not always identified in their medical charts in the VA, conversations have revealed that the majority suffer from the effects of blast related injuries due to direct or indirect fire in combat theatres. Many of the wounded suffer from other adverse side effects of TBI. The counts of secondary diagnosis illustrated in *Figure 1* are for unique veterans but are mutually inclusive in that the same diagnosis may be recorded twice for the same veteran at outpatient visits or at inpatient admissions. In the Appendix in *Figure A1* is contained the total counts of secondary ailments recorded multiple times among the cohort at inpatient admissions and outpatient visits.

Data on only 25 veterans whom we are actively following was available when this report was first compiled. Some delay exists between obtaining consent from the patient and providing him/her with the

necessary passwords and ID to enable data entry. We will update the tables in our upcoming quarterly reports. At that time we will provide also the results of the first of our statistical analyses.

Figure 1: Secondary diagnosis among veterans recorded during inpatient (IP) and out patient (OP) visits. (n=25)



As can be observed, Post Traumatic Stress Disorders and the adverse effects of TBI manifested as headaches and cognitive impairment were common ailments of our study cohort. This is clearly indicated in the care coordination provided to veterans with the issues pertaining to cognition and psychosocial complications requiring urgency and providing challenges in providing care. Substance abuse, involving prescribed medications, alcohol and street drugs also complicates treatment. A more detailed description of the top 30 secondary diagnosis and ICD9 codes and observed counts at inpatient admissions and outpatient visits is contained in *Table A1* in the Appendix.

Baseline Surveys

We have started collecting data as required by our protocol on a variety of functional, cognition, social integration and mental health outcomes. The tables containing the statistics are listed in the Appendix after the respective instrument used to collect the data. We have not used the Quebec User Evaluation of Satisfaction with Assistive Technology (QUEST) questionnaire as most enrollees have a diagnosis of mild TBI and do not require assistive Technology such as wheelchairs or prosthetics. As we enroll veterans who are more seriously injured and require assistive technology we will initiate use of the QUEST instrument. As may be noticed many of the instruments have overlapping questions in the areas of function, cognition and psychosocial adjustments. Yet each instrument has its own peculiarity in assessing veterans' health status and has independently been shown to provide for reliability and validity in measurement. We therefore have maintained the integrity of each instrument and have not altered any of the questions posed. Repeated measures will be conducted over time and appropriate statistical analysis will reveal changes over time as indicated in the initial protocol and statement of work.

The aim of gathering information is twofold: 1) To characterize rehabilitation trajectories over time in the areas of function, cognition, psychosocial adjustment, integration into society and mental health disorders

over time and 2) To individualize treatment patterns customized to each veterans needs so as to maximize the effect of telerehabilitation. Unlike traditional telemedicine that deals with disease specific monitoring or intervention (diabetes, CHF, dementia etc), our cohort exhibits a very diverse population in terms of disease affliction, complexity and propensity to receive care.

Post Traumatic Stress Disorders

In September 2008 DOD extended our study to separately follow and treat a total of 15 veterans with TBI and PTSD using a variety of measures and instruments. In January 2009 we started enrolling veterans who meet this inclusionary criterion. We have enrolled a total of 4 veterans but have baseline PTSD questionnaire data on only 3 of them. Due to the small sample we have delayed reporting the same but will do so as the number of enrollees in this group increases.

Functional Independence Measure™ (FIM) and Functional Assessment Measure (FAM): The (FIM™)[1,2] is a widely accepted functional assessment measure in use in the rehabilitation community. The FIM measures independent performance in motor and cognitive skills in addition to the ADLs pertaining to the self care categories of feeding, grooming, bathing, dressing upper body, dressing lower body and toileting. The FIM is proprietary. We have therefore captured all elements of the FIM in an expanded version of the same which includes elements in Functional Assessment as well.

Because disturbances in communication, cognition, and behavior are prominent characteristics after brain injury, additional items considering those issues were added to the FIM, resulting in a functional assessment measure, FIM+FAM.[3] The FIM+FAM has been increasingly adopted as an outcome measure in brain injury rehabilitation.[4,5]

Findings: Table 2 provides for the means, standard deviation and range of self scoring by veterans. This constitutes our baseline scores. The range of scoring for each item is 1-7 with a response of 1 denoting a near total assistance (able to complete less than 25% of task) and 7 implying complete independence. The range of 1-7 imposes ceiling effects on responses. The cohort in general performed well in self care items such as grooming, feeding, bathing and dressing as well as toileting. Except for one veteran confined to a wheelchair, as a group they indicated good mobility and locomotion as expressed by transfers to chairs, cars, climbing stairs and using the tub or shower. Communication skills as contained in reading and verbalizing were adequate. As clearly evident psychosocial adjustment and cognitive function are the main areas of concern in coordinating care. Depression, anger, substance abuse, inability to integrate into society and post traumatic stress disorders of varying magnitude and complexity afflict many returnees with wounds incurred in war. Emotional outbursts are fairly frequent among this population.

Our care coordination therefore has been mostly directed towards facilitating psychological counseling and psychiatric care. Due to the shortage of mental health experts in the VA and the large number of veterans who require this service our efforts at obtaining the needed care for our cohort has been challenging.

Table 2: FUNCTIONAL INDEPENDENCE MEASURE™ AND FUNCTIONAL ASSESSMENT MEASURE (n=25)

Variable	Mean	Median	Std Dev	Minimum	Maximum
SELF CARE ITEMS (Totals)	6.51	7.00	0.97	1	7
Feeding	6.64	7.00	0.99	3	7
Grooming	6.68	7.00	0.75	4	7
Bathing	6.28	7.00	1.49	1	7
Dressing Upper Body	6.32	7.00	1.44	1	7
Dressing Lower Body	6.32	7.00	1.49	1	7
Toileting	6.48	7.00	1.23	3	7
Swallowing	6.88	7.00	0.60	4	7
SPHINCTER CONTROL	6.70	7.00	0.69	4	7
Bladder Management	6.72	7.00	0.74	4	7
Bowel Management	6.68	7.00	0.69	4	7
MOBILITY ITEMS	6.60	7.00	0.93	1	7
Bed	6.72	7.00	0.74	4	7
Chair	6.48	7.00	1.33	1	7
Wheelchair	6.88	7.00	0.60	4	7
Toilet	6.52	7.00	1.33	1	7
Tub or Shower	6.44	7.00	1.36	1	7
Car Transfer	6.56	7.00	1.00	3	7
LOCOMOTION	6.52	6.75	0.70	1	7
Walking	6.48	7.00	0.77	4	7
Wheelchair	6.84	7.00	0.62	4	7
Stairs	6.16	6.00	1.31	1	7
Community Access	6.60	7.00	0.76	4	7
COMMUNICATION ITEMS	5.91	6.14	0.99	2	7
Comprehension-Audio	5.32	6.00	1.68	3	7
Comprehensive-Visual	5.48	6.00	1.69	3	7
Expression-Verbal	6.48	7.00	1.00	3	7
Expression-Non-Verbal	6.60	7.00	0.87	3	7
Reading	5.68	6.00	1.52	2	7
Writing	5.44	6.00	1.53	2	7
Speech Intelligibility	6.36	7.00	1.04	3	7
PSYCHOSOCIAL ADJUSTMENT	4.81	5.25	1.75	1	7
Social Interaction	5.16	6.00	2.03	1	7
Emotional Status	4.68	5.00	1.82	2	7
Adjustment to Limitations	5.00	6.00	2.12	1	7
Employability	4.40	5.00	2.48	1	7
COGNITIVE FUNCTION	4.55	5.00	1.46	1	7
Problem Solving	4.60	5.00	1.66	2	7
Memory	3.20	3.00	1.50	1	7
Orientation	4.96	6.00	1.86	1	7
Attention	4.48	5.00	1.90	1	7
Safety Judgment	5.52	6.00	1.90	2	7

Patient Competency Rating: The Patient Competency Rating provides for a rating of basic competencies in performing everyday chores with responses on a 1-5 scale with 1 denoting the most difficulty in addressing a

problem and a score of 5 implying ability to handle the problem with total ease.

Findings: Findings of the completed questionnaires are contained in Table 3 and are similar to those of FIM/FAM with psychosocial adjustment (problem controlling temper, keeping from being depressed, adjusting to changes) and cognition (remembering, scheduling and participating) posing challenges to the veterans and care providers. As may be noticed the range of most responses is 1-5 though the means tend towards the higher numbers. This is due to the binary nature of our cohort where the majority of individuals display good heath and a small minority are of poor health status.

Table 3: Patient Competency Rating
(n=25)

Variable (problem area)	Mean	Median	Std Dev	Minimum	Maximum
1. Preparing meals	3.48	4	0.92	1	5
2. Dressing myself	4	4	0.96	1	5
3. Personal hygiene	4	4	0.96	1	5
4. Washing dishes	3.76	4	0.93	1	5
5. Doing laundry	3.6	4	1.04	1	5
6. Taking care of finances	2.56	3	1.19	1	5
7. Keeping appointments	2.52	2	0.82	1	5
8. Starting conversations	2.68	2	1.03	1	5
9. Staying involved work	2.52	3	0.65	1	4
10. Remembering dinner last night	2.56	2	0.92	1	4
11. Remembering names	2.48	2	0.82	1	4
12. Remembering daily schedule	2.52	3	0.65	1	4
13. Remembering important things	2.32	2	0.75	1	4
14. Driving car	3.68	4	1.11	1	5
15. Getting help confused	3.12	3	0.93	1	5
16. Adjusting to changes	2.6	3	0.82	1	4
17. Handling arguments	2.32	2	0.95	1	4
18. Accepting criticism	2.96	3	1.06	1	5
19. Control crying	3.32	3	1.22	1	5
20. Acting appropriately	3.32	3	0.95	2	5
21. Showing affection	2.52	2	1.08	1	5
22. Participating in groups	2.68	3	0.63	2	4
23. Recognizing upsetting others	2.76	3	0.83	2	4
24. Scheduling daily activities	2.64	3	0.81	1	4
25. Understanding instructions	3	3	0.71	1	4
26. Meeting daily responsibilities	3.12	3	0.78	2	4
27. Controlling temper	2.28	2	0.84	1	4
28. Keeping from being depressed	2.32	2	0.8	1	4
29. Keeping emotions from affecting abilities	2.72	3	0.84	1	4
30. Control laughter	3.88	4	0.78	2	5
Totals	**2.94**	**2.93**	**0.45**	**1**	**5**

Craig Handicap Assessment and Reporting Technique: The CHART provides for assessing assistance levels, time spent (and with whom) and financial resources. We have truncated the variables and measurement. The original instrument used is contained in the Appendix in Table A3. The standard deviations indicate great variability among veterans in each of the categories listed substantiating our prior finding that our cohort is binary in nature on care needs especially in the areas of cognition and integration into society.

.

Table 3: Craig Handicap Assessment and Reporting Technique (n=25)

Variable	Measurement	Mean	Median	Std Dev	Minimum	Maximum
Physical assistance for	Hrs paid	0.28	0.00	1.40	0	7
Personal care activities						
	Hrs unpaid_	2.64	0.00	6.89	0	24
Time someone is with you in your home	Hrs assisting	4.24	5.00	1.90	1	6
	Hrs help remembering	3.16	3.00	0.75	2	4
Typical day	Hrs out of bed	14.44	16.00	5.27	0	20
	Hrs out of house	3.52	4.00	2.10	0	7
Nights spent away from your home	In previous year	2.36	2.00	1.32	1	4
Hours per week spent working in a job	Hrs	15.20	7.00	18.67	0	60
Employment status	Yes=1; no=0	0.36	0.00	0.49	0	1
Hours per week spent in school working toward a degree	Hrs	1.12	0.00	3.43	0	15
Homemaking including parenting	Hrs wk	11.36	5.00	13.00	0	50
Maintenance	Hrs wk	4.88	2.00	5.92	0	20
Recreational activities	Hrs wk	2.56	2.00	3.04	0	10
People living with	Number	2.40	2.00	1.61	0	6
Any significant other	Significant others	0.82	1.00	0.39	0	1
Relatives living with	Number	2.08	2.00	1.71	0	6
Business / organizational associates visited monthly	Number	3.40	0.00	11.98	0	60
Friends (non-relatives) visited, phoned, at least once a month	Number	2.48	2.00	2.22	0	10
Strangers initiated a conversation with	Number	0.96	1.00	0.93	0	3
Combined annual yearly income	Nominal scale	4.48	4.00	2.29	0	8
	<20k to >80k					
Yearly medical care expenses	Nominal scale	2.36	2.00	1.80	1	8
	<1k to >15k					

Cost Analysis

We have started abstracting cost data from the Tampa VA Decision Support System on the costs to the VHA of treating the cohort of veterans we have consented for the research. Though the Telerehab study officially began in June 2008 many of the injured we follow have sought treatment at the JAH from earlier dates. Hence for this preliminary date analysis we have abstracted all outpatient and inpatient cost information incurred dating from 7/31/2007 the earliest time available for cost data. The VA uses a cost system that includes a fixed and variable cost of treatment for each encounter, procedure medication etc. The costs are then summed for each inpatient admission and outpatients visit. Table 4 outlines the results of our cost findings. These costs do not include the costs of the telerehabilitation intervention (personnel costs, equipment and ancillary costs). At a later time we will include these costs as required by statement of work in studying the effectiveness of the telerehabilitation intervention.

Table 4: Average costs of treating veterans

Variable	Mean	Std dev	Minimum	Maximum
Inpatient admissions (n=8)	8033	34,632	3221	247,313
Outpatient visits (n=25)	246	2,474	5	14,401

Length of Stay (LOS)

Average costs of treatment for inpatient admissions are impacted by the length of stay. We have started calculating length of stay as part of our analysis of costs. Table 5 displays the inpatient length of stay results for our study cohort. The majority of our veterans had multiple inpatient admissions. However, most of those inpatient admissions were for only one day, resulting in a median value of 1, despite some subjects having had lengthy inpatient stays.

Table 5: Length of Stay

Mean	Median	Std Dev	Minimum	Maximum
1.92	1	8.55	0	130

Patient Satisfaction

As required by our protocol we are conducting the first our patient satisfaction surveys with the telerehabilitation intervention online. We will communicate the findings of our patient satisfaction surveys in our subsequent reports. We frequently receive notes via email expressing gratitude of our efforts. *More encouragingly, we have yet to hear of any discontentment to our telerehabilitation intervention from the population we serve*. A sampling (verbatim) of the messages of appreciation follows. The words speak for themselves.

1) JH was injured in an IED blast in Iraq and diagnosed with Traumatic brain injury/right transfemoral amputation/polytrauma including right hand second digit amputation and originally treated at Walter Reed AMC.

He writes (5/18/09) “i really do apprieciate what you do for me. i just want to say how helpful this program is, thank you it has been extremely helpful”.

2) RP was injured when his truck hit an anti-tank mine in Iraq.

He writes (4/15/09) ” Thanks alot Sue, I really appreciate it. I love this thing. The computer is great. Ill really be disappointed if the va doesnt continue this program. The possibilities are endless."

3) KL’s brother writes (4/28/09)” I have 90% disavility because of my PTSD(70%). You help my brother (KL), and he told me great things about the (program). how can you help me aquire some of the benefits. Thank You very much, God Bless”.

Key Research Accomplishments: None so far.

Reportable Outcomes: None so far.

Conclusion

The major findings our research so far indicates the follows:

1. Functional capabilities measured by locomotion and mobility appear to have stabilized among our cohort of veterans while deficiencies in cognition (memory, problem solving), psychosocial adjustment (anger, emotional status) and problems in integrating into society pose challenges.
2. Headaches, depression and other Post Traumatic Stress disorders appear to afflict a majority of patients.
3. Individualized treatment pathways are needed for rehabilitation and ultimate integration into society.
4. Veterans have expressed appreciation for the program.

We are satisfied with our progress and expect to consent our projected enrollment of 60 veterans by the end of summer 2009. We would like to enhance the robustness of our telerehab study by proposing to expand our present research into a randomized control study (RCT) by following as a control group up to 30 veterans who receive traditional care at the Tampa VA and are not subject to our intervention. Such an RCT would greatly enhance the power of our study and enable investigation into the cost effectiveness of telerehabilitation and the time trajectories of various health outcomes while adjusting for confounders, characteristics that our present study lacks. We will work closely with DOD to try and redefine our statement of work to address this undertaking.

References

[1] Wright, J. The FIM(TM). The Center for Outcome Measurement in Brain Injury. http://www.tbims.org/combi/FIM.

[2] Dodds TA, Matrin DP, Stolov WC, Deyo, RA. A validation of the Functional Independence Measurement and its performance among rehabilitation inpatients. *Arch Phys Med Rehabil 1993; 74(5):*531-6.

[3] Hall KM, Hamilton BB, Gordon WA, et al. Characteristics and comparisons of functional assessment indices: disability rating scale, functional independence measure, and functional assessment measure. *J Head Trauma Rehabil 1993*;8:60–74.

[4] Hawley CA, Taylor R, Hellawell DJ, Pentland B. Use of the functional assessment measure (FIM+FAM) in head injury rehabilitation: a psychometric analysis *J Neurol Neurosurg Psychiatry 1999;67*:749–754.

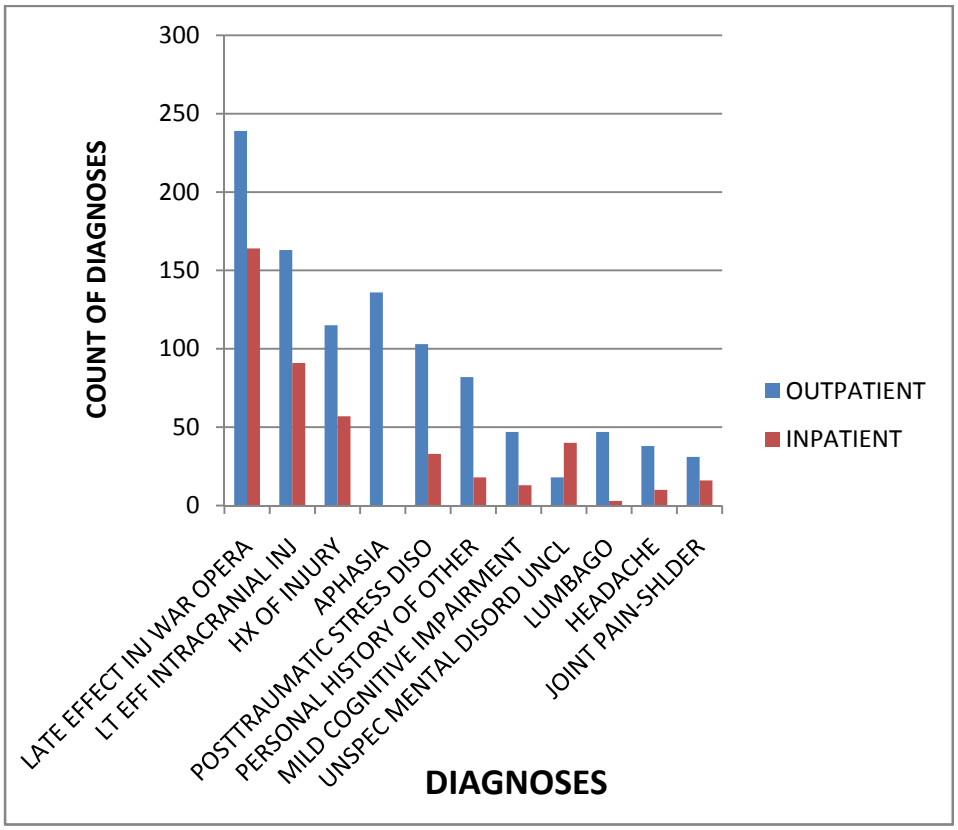
[5] Seel RT, Wright G, Wallace T, Newman S, Dennis L. The utility of the FIM+FAM for assessing traumatic brain injury day program outcomes. *J Head Trauma Rehabil 2007; 22(5):*267-77.

APPENDIX

Table A1: Secondary diagnosis recorded during inpatient (IP) and out patient (OP) visits (n=25).

Secondary diagnosis	ICD9	Outpatient	Inpatient	Total
1. PTSD	309.81	10	7	17
2. Headache	784	5	4	9
3. Personal Hx Other	V15.59	5	4	9
4. Mild Cognitive Impairment	331.83	5	3	8
5. Unspecified Mental Disorder	294.9	2	5	7
6. Late Effect Injury of War	E999.0	4	3	7
7. Depress Disorder Not Elsewhere Classified (NEC)	311	1	3	4
8. Hearing Loss Unspecified	389.9	2	2	4
9. Joint Pain-Shoulder	719.41	2	2	4
10. Cervicalgia	723.1	2	2	4
11. Backache Not Otherwise Specified (NOS)	724.5	1	3	4
12. Brain Injury NEC-Mod Coma	854.03	1	3	4
13. Late Effects Intracranial Injury	907	0	4	4
14. Mood Disord Cond Class EL	293.83	1	2	3
15. Major Depress Disorder-Mod	296.22	1	2	3
16. Anxiety State Unspecified	300	2	1	3
17. Adjustment Disorder w Mix Anxiety	309.28	1	2	3
18. Frontal Lobe Syndrome	310	0	3	3
19. Postconcussion Syndrome	310.2	0	3	3
20. Refraction Disorder NOS	367.9	1	2	3
21. Lumbago	724.2	2	1	3
22. Pain in Limb	729.5	1	2	3
23. Insomnia Unspecified	780.52	2	1	3
24. Glucocorticoid Deficiency	255.41		2	2
25. Hyperlipidimias NEC/NOS	272.4	1	1	2
26. Episodic mood disorders	296.32	1	2	2
27. Alcohol Abuse Unspecified	305	1	1	2
28. Tobacco use disorder	305.1	1	1	2
29. Chronic pain Syndrome			2	2
30. H'plegia NOS			2	2

Figure A1: Total count of diagnoses for all inpatient admissions and outpatient visits (n=25).



TOP 11 FREQ DX TBI SUBJECTS

	OUTPATIENT	INPATIENT	TOTAL
LATE EFFECT INJ WAR OPERA	239	164	403
LT EFF INTRACRANIAL INJ	163	91	254
HX OF INJURY	115	57	172
APHASIA	136	0	136
POSTTRAUMATIC STRESS DISO	103	33	136
PERSONAL HISTORY OF OTHER	82	18	100
MILD COGNITIVE IMPAIRMENT	47	13	60
UNSPEC MENTAL DISORD UNCL	18	40	58
LUMBAGO	47	3	50
HEADACHE	38	10	48
JOINT PAIN-SHLDER	31	16	47